Notes

- **Revised charts 5/15/97**
  - ***Page numbers were removed for flexibility***
  - ***Figures will be made clearer for overheads***
    - **Lee, where do you want overheads sent? Will be ready Friday pm.**
    - **Lee, conversion to Powerpoint TBD; will e-mail Friday if possible**

American Petroleum Institute

Hazardous Air Pollutant Emissions from Gas-Fired Boilers and Process Heaters

ICCR Presentations

Research Triangle Park, North Carolina

May 20-22, 1997

American Petroleum Institute

Findings

- ✓ **HAP emissions from gas-fired boilers & process heaters are near or below detection limits**
- ✓ **HAP emission factors for boilers & process heaters fired by natural gas & process gas are similar on a Btu basis**
- ✓ **HAP emission factors for boilers & process heaters are equivalent**
- ✓ **HAP emission factors for boilers & process heaters with and without NOx emissions controls are equivalent**

American Petroleum Institute

HAP Emission Projects

❑ Petroleum Envrionmental Research Forum

"Toxic Combustion By-products from Refinery Boilers and Heaters"

- ➪ ***Cooperative Research and Development Agreement***
  - **Industrial, DOE funding; EPA participation**
  - **Experimental and theoretical work at Sandia National Labs, Lawrence Livermore National Labs, UCLA, Stanford**
- ➪ ***Full-scale burners***
- ➪ ***High-quality tests under wide range of well-characterized conditions***
- ➪ ***Systematic variation of combustion process and design parameters***

❑ California AB2588 air toxics emission inventories

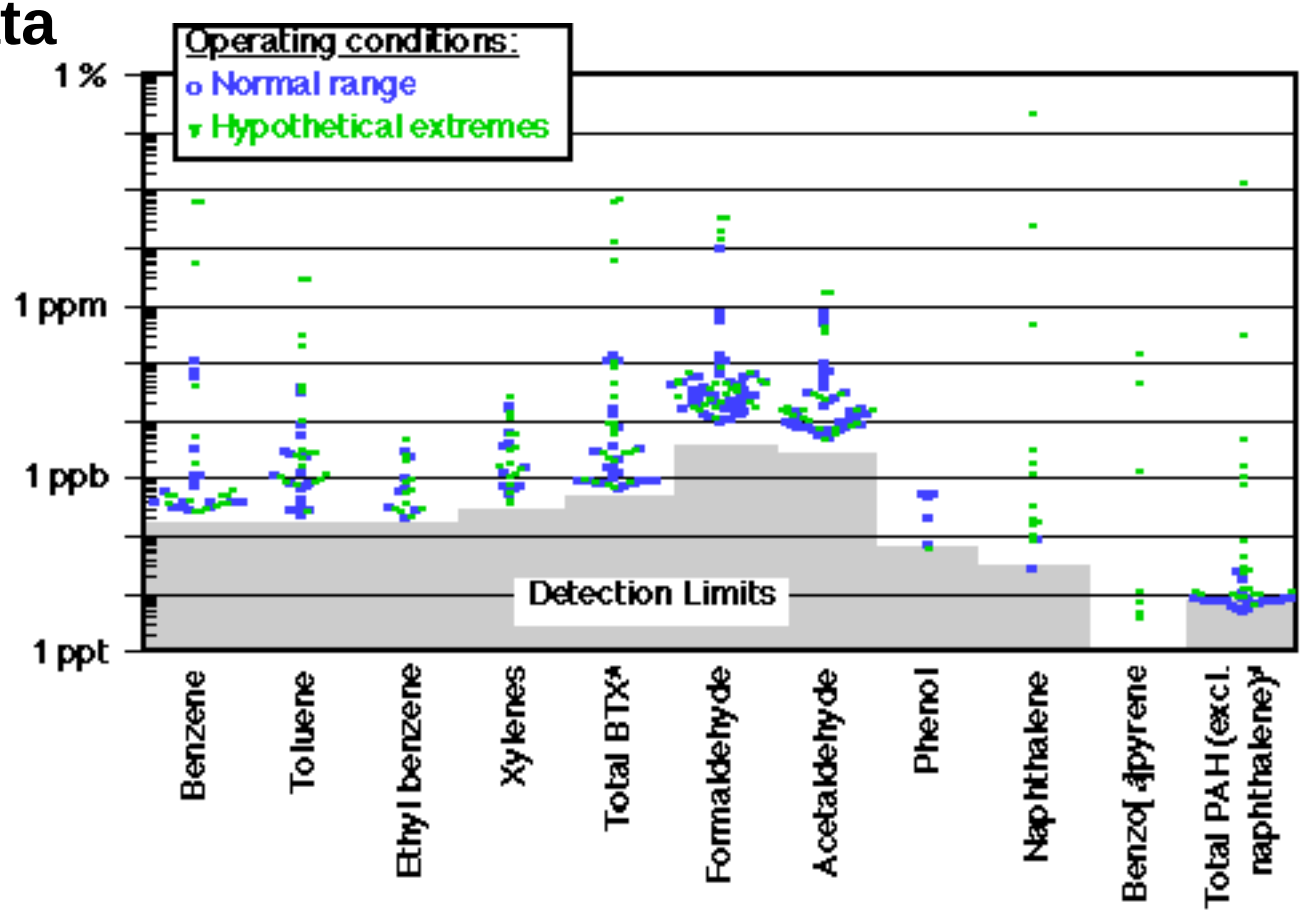
- ➪ ***Source testing by Western States Petroleum Association and individual companies***
- ➪ ***WSPA/API emission factor database for petroleum industry combustion sources***

❑ Emphasis on highest-quality data

American Petroleum Institute

Measurements show HAP emissions are near or below detection limits

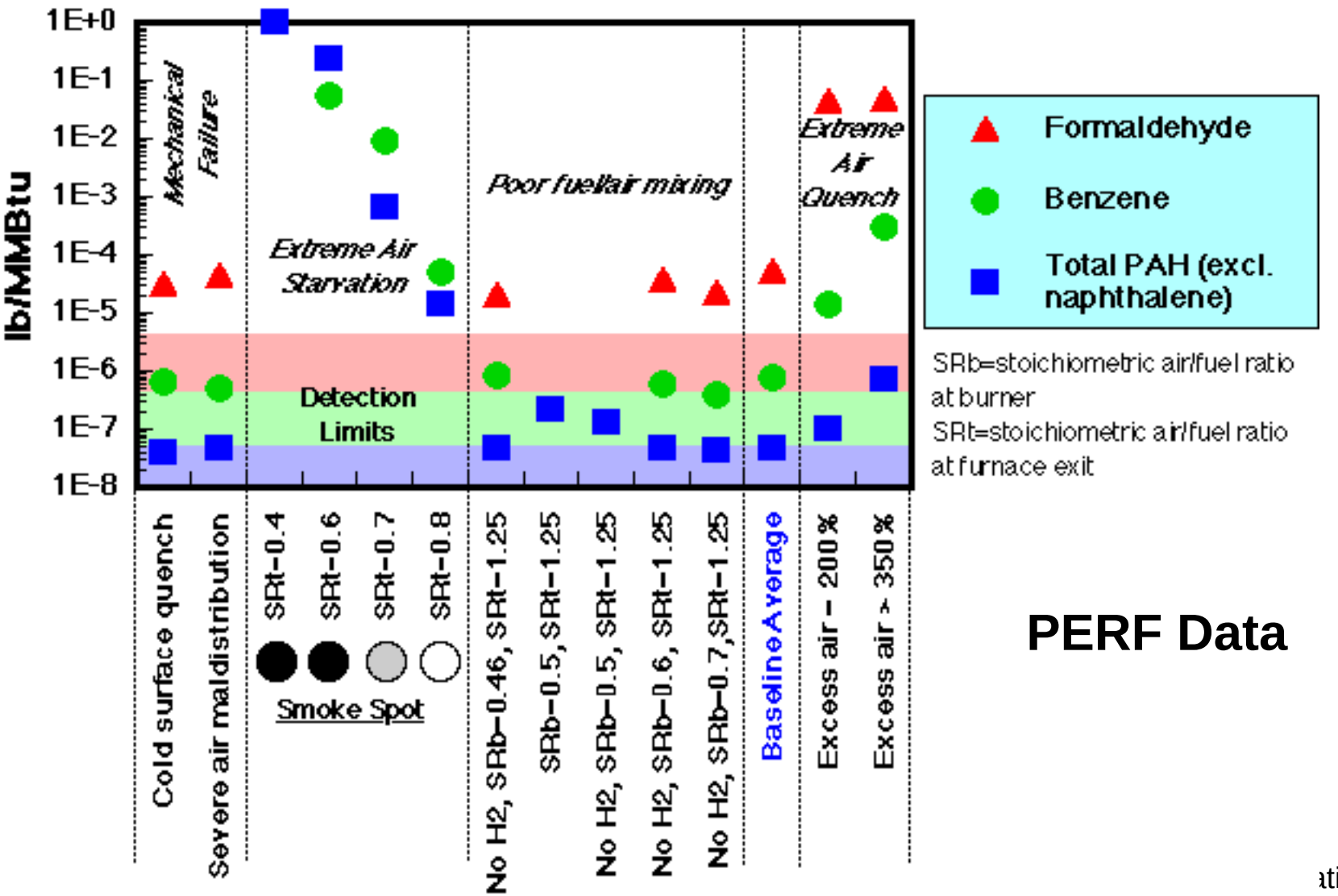
PERF Data



*sums shown only where at least one substance detected; full detection limits for undetected substances used in sum.

American Petroleum Institute

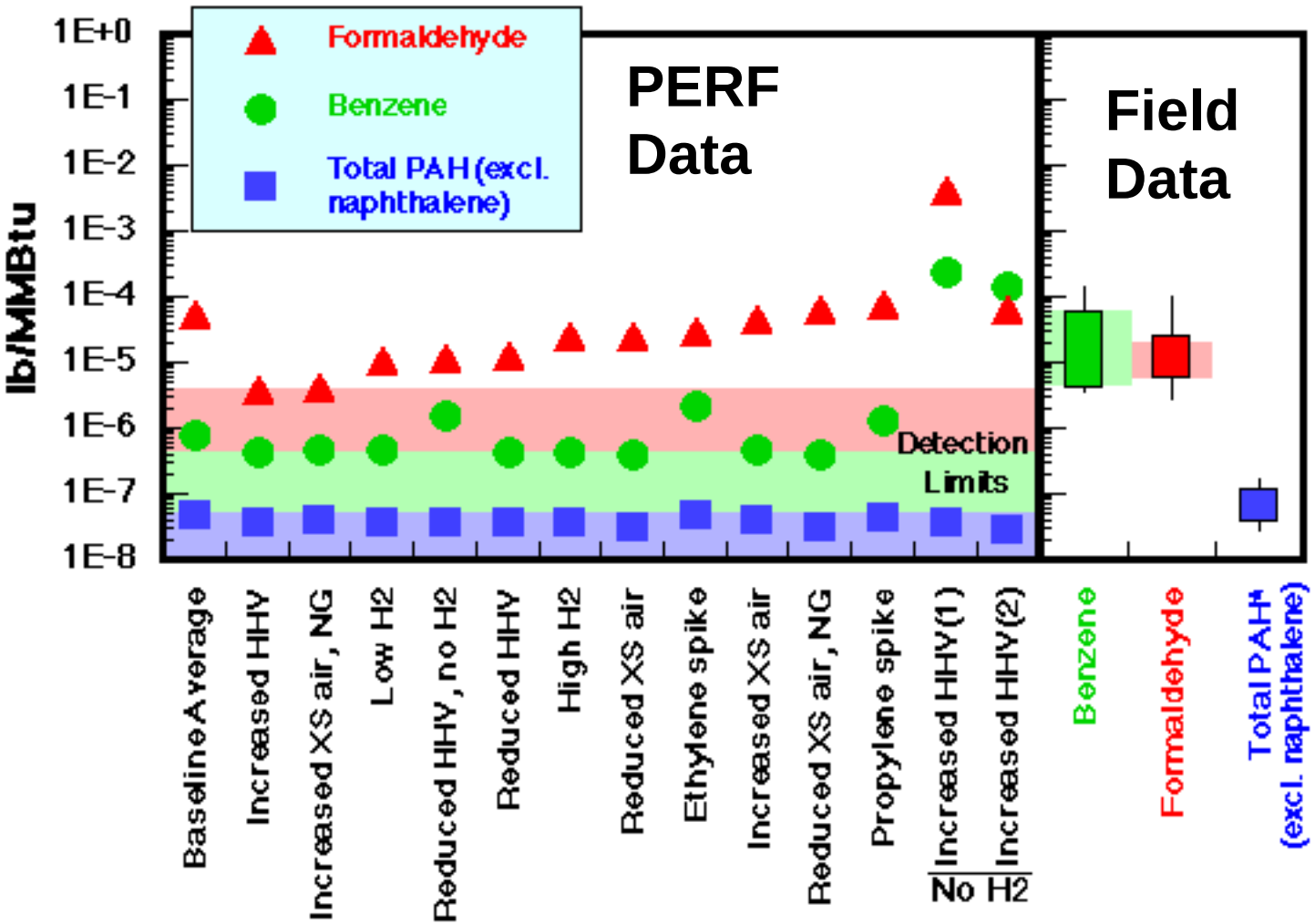
Increased HAP emissions occur only by severe air starvation or quenching



PERF Data

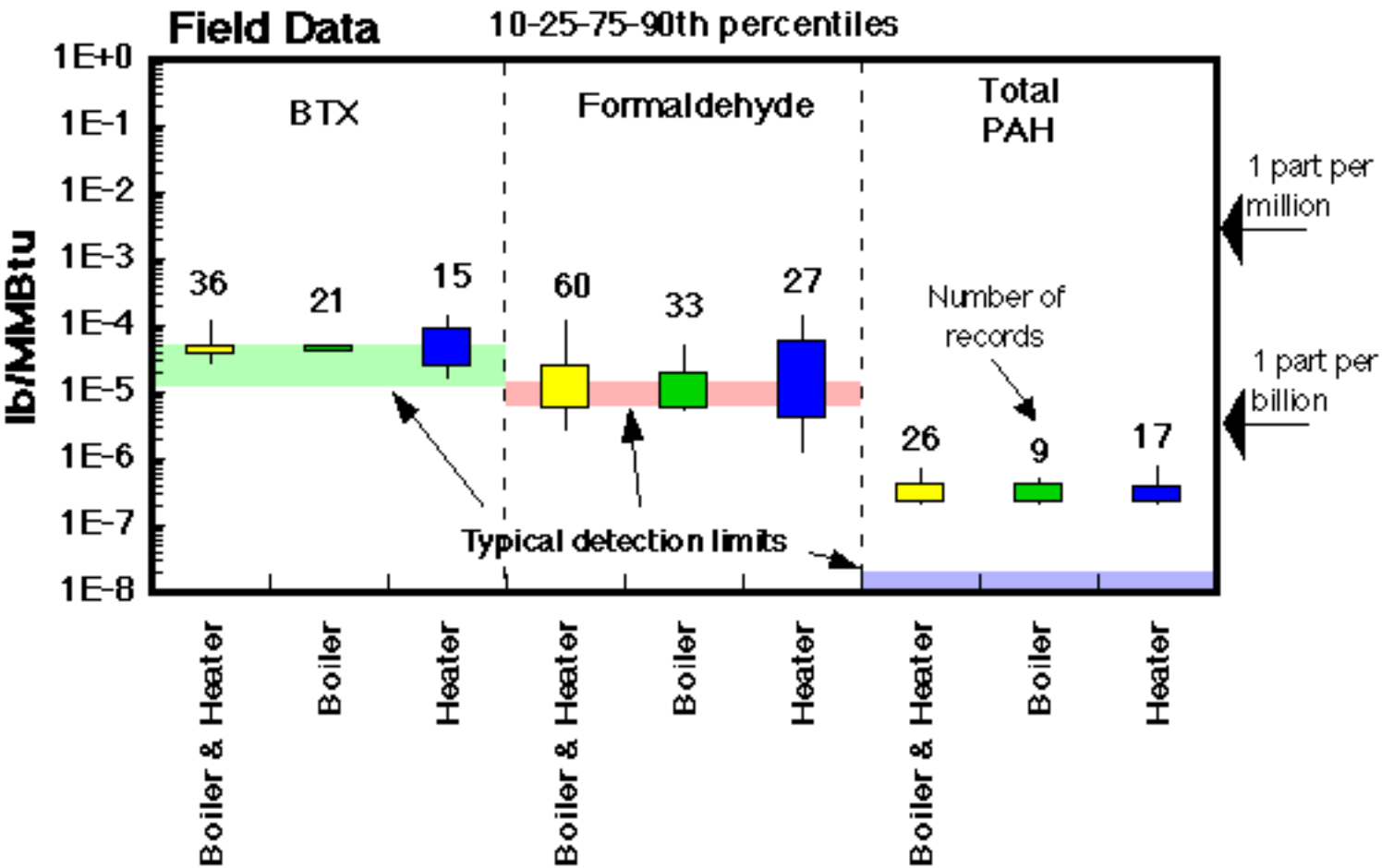
American Petroleum Institute

HAP emissions are near or below detection limits under wide range of normal operating conditions



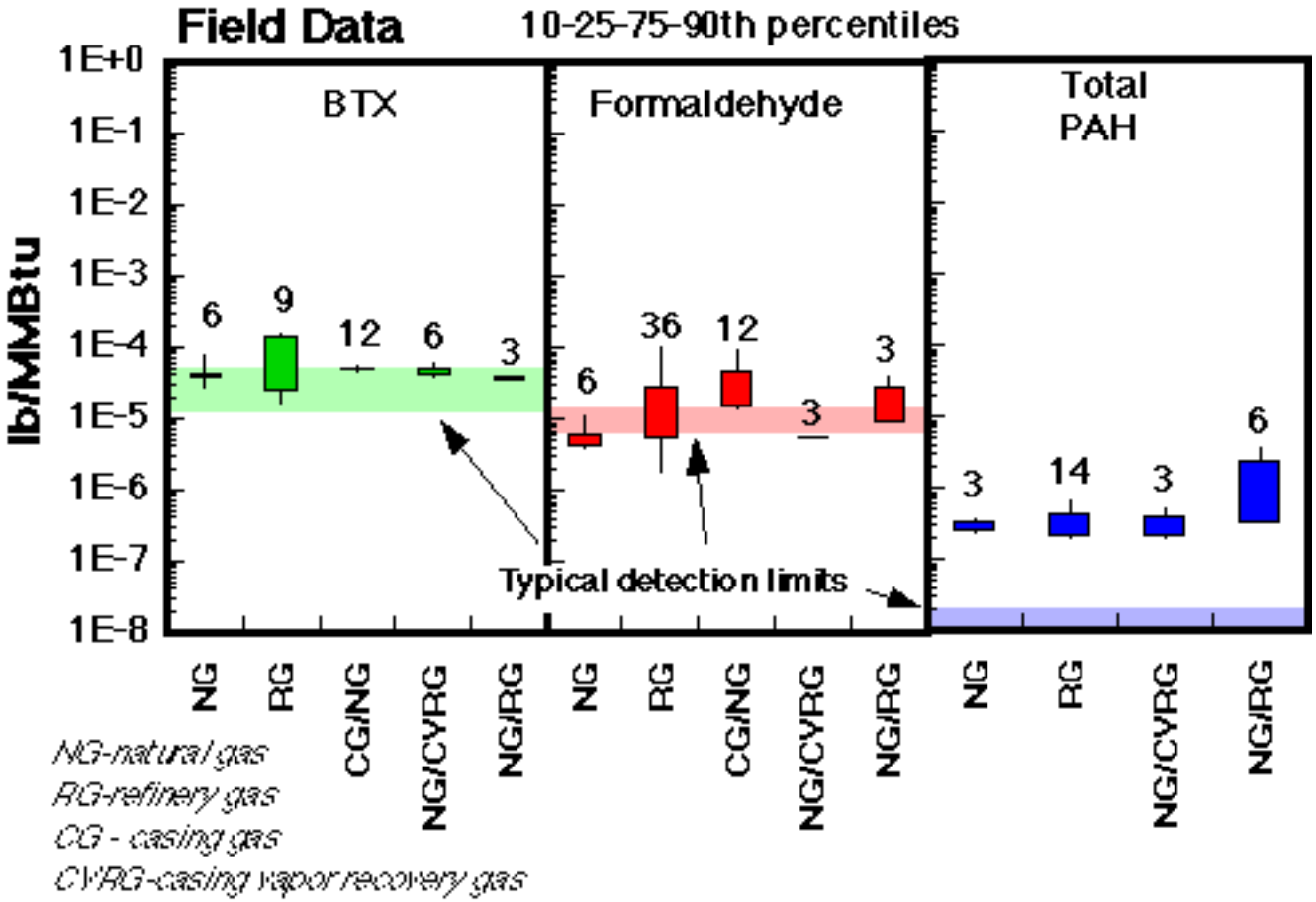
American Petroleum Institute

HAP emission factors are equivalent for Boilers and Process Heaters



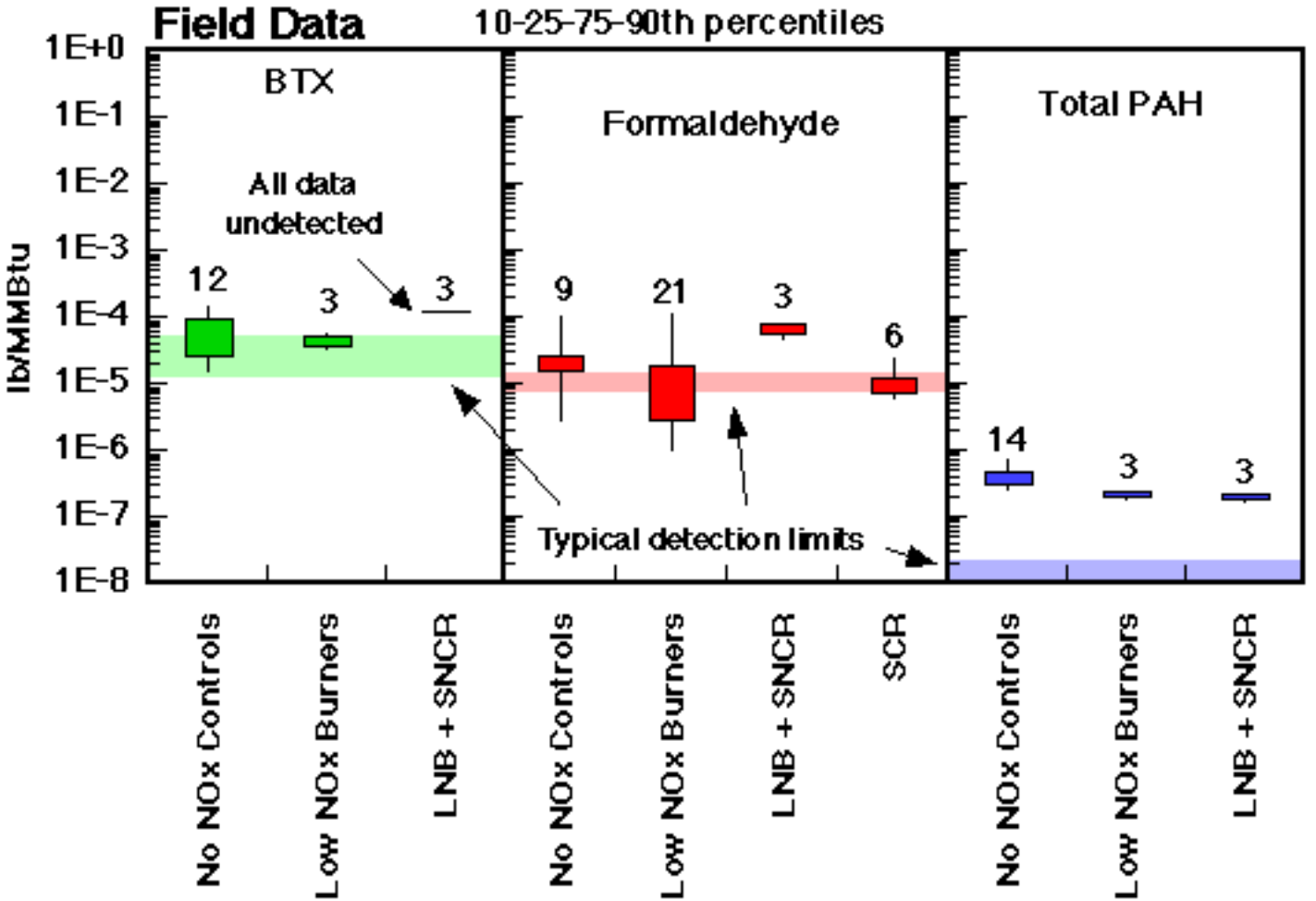
American Petroleum Institute

Gaseous fuels have similar HAP emission factors regardless of composition and heating value



American Petroleum Institute

NOx emission controls generally have no impact on HAP emissions



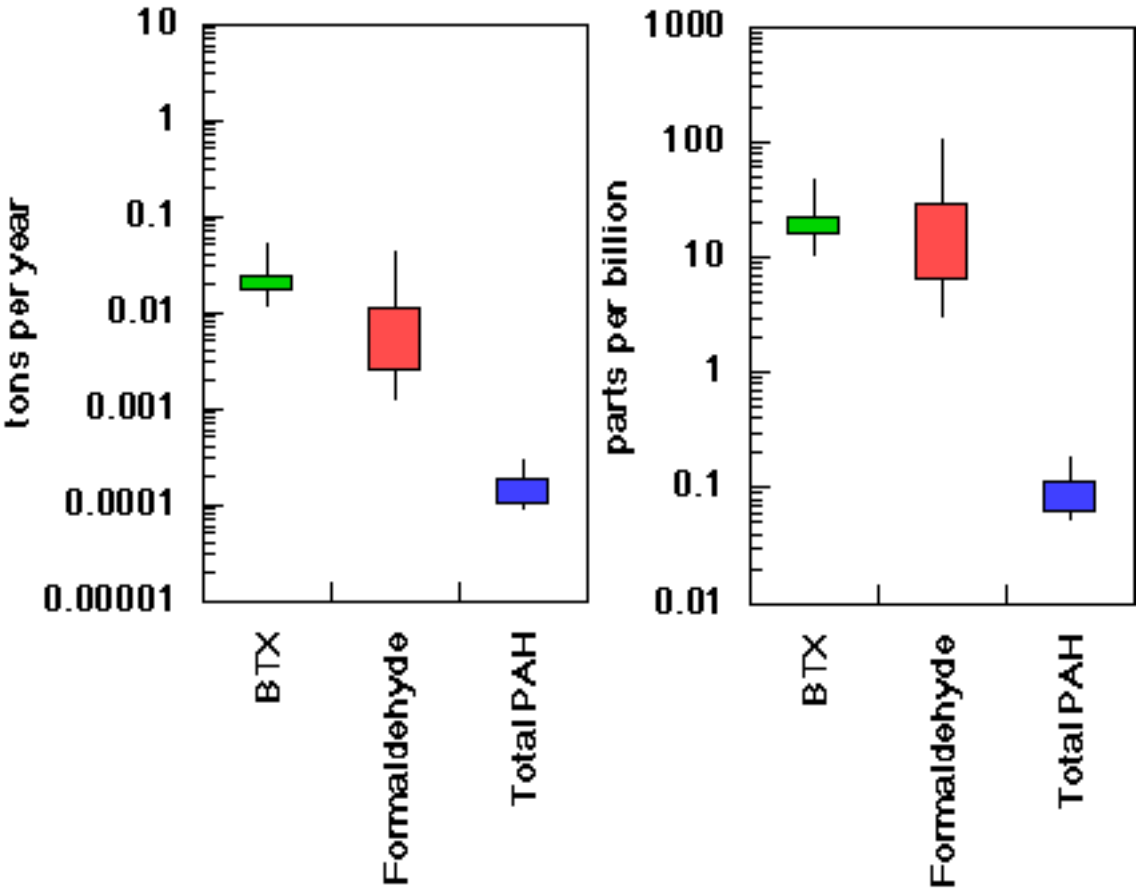
EER

ICCR Presentations
May 20-22, 1997, RTP, North Carolina

American Petroleum Institute

Typical boiler/heater HAP emissions

- **100 MMBtu/hr**
  - ***boilers & heaters together***
  - ***all fuels***
  - ***with/without controls***



Findings

- ✓ **HAP emissions from gas-fired process heaters and boilers are:**
  - ➪ ***near or below detection limits***
  - ➪ ***equivalent for boilers & process heaters***
  - ➪ ***similar for natural and process gas on a Btu basis***
  - ➪ ***not affected by NOx controls***